CAR PAINTING.*

BY MR. D. D. ROBERTSON, MASTER CAR PAINTER OF THE MICHIGAN CENTRAL RAILROAD.

Some of the grandest inventions and achievements have been the result of accident; and in the regular routine of mechanical or professional business, successful results have at times been attained in the absence of any practical or scientific reason therefor. Some professions are of such a nature that there is no difficulty in making certain and definite calculations as to the final issue of a piece of work, while with others everything is so dependent upon circumstances as to make it quite impossible to determine the end from the beginning. There are few pursuits more dependent in this way than that with which we are connected.

To be a successful car painter, requires the closest attention, the most thorough application, and the most constant watching, and even then "deviltries" will appear which baffle the skill, experience, and patience of the most practical and amiable of the craft. Many, however, of the vexations and annoyances of the paint shop have been overcome, and a large amount of the heartrendings, crackings, flakings, and pittings are found to be due more frequently to want of knowledge, attention, and care, than to inferior material. While we admit the bad results caused by the use of such material, sudden changes in the weather, etc., there are at the same time defects and imperfections to be seen on our cars that can only be designated as careless blunders. An interchange of views formed by careful observation has done much, and will do more, to improve the character of our work. Allow me then to give as briefly as possible the method I at present pursue, not with the idea of presenting anything new or startling, but to draw from others any experience that may differ from my own.

NECESSITY OF A GOOD FOUNDATION.

In painting, as in most other things, a good foundation is absolutely necessary, and to secure this everything depends upon the quality and mixing of the material, and also upon the handling of it. The priming of a car is regarded by some painters as a simple matter, and as a matter of economy this preliminary work is often placed in the hands of inexperienced or low-priced workmen. This is a false step at the start, and when once taken we have to hobble through the whole job. In every part of the work there is a definite object to be accomplished. The object in priming is to fill the pores of the wood. It must be cohesive and have a proper elasticity. The thinners used should enter the pores without congealing on the surface, thus insuring permanency.

THE PRIMING.

For priming, I use keg lead mixed with the best raw linseed oil. To a pint of oil I add a tablespoonful of Japan size. In mixing, care should be taken not to have it too thick, and to be sparing in the use of Japan, the excessive use of which tends to lessen elasticity as well as durability. Some painters use boiled oil in priming to avoid the greasy character of raw oil, but my objection to the former is that it is less penetrating, and that it tends to congeal on the surface. The best method of preparing raw oil for priming that I have ever used, is as follows: Take 1 gallon of oil, put ½ lb. litharge into it, place near the stove, and shake three or four times a day for a few days, and then let it settle and run off. This improves its drying properties and frees it from grease. No gold size is used with it. Before applying, all nail holes, crevices and beads should be properly filled, and then it should be laid on regularly and evenly, leaving no fat edges.

After the work has stood from four to six days, or longer if possible, it is then ready for the second coat, which is the same as the priming, only a little heavier. The same care should be taken to lay it on evenly and fill all crevices and holes. I prefer puttying after the second coat is on, as the holes are more likely to be filled, which is necessary for the putty to adhere; a less body of putty is also required, and therefore is less likely to swell, which is a source of trouble very often when the work is nearly completed. As a precaution against this, some painters have the holes soaked with warm water before the cars leave the erecting shop.

THE PUTTY.

The hard putty I use is composed of dry white lead and whiting in equal parts, mixed with Japan gold size and a very small quantity of raw oil or a little keg lead. I have found the whiting makes the putty less liable to swell; and let me say here that very frequently the painter is blamed for this, when the actual cause is the shrinkage of the wood. The hole or crack should be completely filled, and the putty may even project a little so that it may be rubbed down to the exact level. Very close attention must be given to this part of the work, so that little or no puttying may be required after the rough stuff has been surfaced.

The putty now being leveled down and the whole body sand-papered, the car is ready for the third coat. This is made with tub lead reduced with "turps,"† and a small quantity of Japan gold size laid on with the usual care. In order to secure a good job these priming coats must be perfectly dry. After three days the rough stuff may be put on.

THE ROUGH STUFF.

There is no end of receipts for rough stuff, but the kind I have used with great satisfaction for some time is composed of 8 lbs. mineral, 3 lbs. dry white lead, 1 lb. tub lead, 2 parts gold size, 1 part rubbing varnish, and thin with turps. The laying on of this preparation is frequently deemed unworthy of the care usually bestowed on painting. But this is a mistake, as all the principles as respects the laying on of paint should be strictly followed in the laying on of rough stuff. A large amount of time is saved by not applying it to the battens, and by leaving about ¾ of an inch diagonally at the corners of the panels. One coat is sufficient except on hard wood, which should have at least two coats. When such wood is very open grained, I prefer knifing it before rough stuffing, using tub lead with a very little turps and Japan. For rubbing rough stuff, I have used different kinds of stone, but have settled down on picked pumice, which is cheaper, and at least as good as any other.

At this stage of the work the car body should be carefully examined, and if any imperfections are found, now is the time to fix them. After thoroughly sand-papering, the work is ready for coloring.

COLORING.

The color on the Michigan Central Railroad cars consists of golden ocher ground heavy in oil along with medium chrome ground in turps and Japan, and brought to the proper consistency with turps. To finish a car properly with this color, four coats are required, and from first to last there cannot be too much care taken in laying it on in order to secure a solid job and lose nothing of what has preceded. The color should be worked quickly, put on sparingly, brushed out well and laid off evenly. I would recommend a flat sable brush as the best and most economical for laying color.

Very often the labor expended in bringing a car up to the point of coloring is completely lost by the mixing of the color, or by the manner in which it is laid. I make no change in the formula of these coats, and do not use any varnish in last coat. The work should be sand-papered and carefully dusted off after each coat, and one day's time at least should intervene between the coats.

VARNISHING.

The car is now ready for varnishing. For the first coat I use an outside rubbing varnish, which can be rubbed down very close in four days and washed clean. This forms a beautiful surface for striping and ornamenting. The men who do the striping should be so arranged that each may work on his specialty, as this secures better work by exciting a greater desire to excel.

STRIPING AND GILDING.

Striping colors are ground heavy in boiled oil with a little Japan gold size and thinned with turps. Furnish each man with a gauge, divide the car into sections, and let each finish his allottedportion. Emulation is thus excited, and each man is responsible only for his own proper work, with no risk of blame that is undeserved. For gilding, I find that a quick size is the best. I use Noble & Hoare's gold size with about one third their wearing body varnish.

FINISHING.

The car is now ready for the finishing coats of varnish. First of all it has to be carefully washed down with cold water to clean off any soiling that may have got on during the striping and ornamenting. The cleaning must be done with brush, sponge, and chamois, and so thoroughly as to remove the smallest particles from mouldings, etc., as the varnish brush is sure to find them and bring them to the surface. In my experience there are comparatively few, even of good workmen, who can varnish a car properly. Some are so afraid of sagging that they put the varnish on sparingly, while others, with the greatest ease and safety, will put a third more on the body without the least tendency to sag—and then again the work of some is much more even and regularly flown than that of others using the same material and on the same body. On the finishing coats as much varnish should be put as they will safely carry. For some time I have abandoned rubbing between the coats. As a matter of beauty, I would prefer a slight rubbing of the first coat, but I willingly sacrifice this advantage to secure what is of more importance, namely, economy and durability. Instead of rubbing before the last coat of varnish is applied, the previous coat must be thoroughly hard and washed down with cold water. Then by using every precaution to get rid of dust, and with care and proper handling, the last coat should stand out, and the entire job reflect credit on the painter and also on the venders of the materials used in the work.

* Read before the recent meeting of Car Painters, at Cleveland, Ohio.

† Painters' term for turpentine.

A New Coloring Matter.

The well known firm of dye manufacturers, Meister, Lucius & Brüning, of Höchst, have brought out a series of colors for the production of ponceau in yellower and redder shades, and also of claret upon woolens. These coloring matters are produced from the sulpho-naphthylates by treatment with the diazo compounds of benzol and its homologues, as well as of naphthalin. These colors can be used for dyeing with the mere addition of sulphuric acid, but the shades are not so bright as when a solution of tin is employed. To 100 kilos of wool, placed in a wooden or well tinned dye bath, are added 2½ kilos tartar, and boiled. The color, previously dissolved, is added as may be required, and 5 kilos of tin composition are gradually added. The wool is then taken out, cooled, and washed. The tin composition is made by mixing 3 parts hydrochloric acid, 1 part nitric acid, and one part water, and dissolving ½ kilo tin in 3 kilos of this acid liquid.

Nickel Pyrites.

At Krageröe, Norway, magnetic pyrites, holding on an average 1·25 per cent of nickel, is worked by the following process, which Friedr. Bode describes in *Dingler's Polytechnic Journal:* The raw ore is smelted with slag from refining in a 13 foot 3 tuyere shaft furnace, the slag made being thrown over the dump, while the raw matte, holding 3·5 per cent of nickel, is roasted in stalls. This roasted matte is smelted in a low furnace with one tuyere, 4 feet high. The slag, holding 1 to 1·5 per cent of cobalt, goes to the ore smelting. The matte contains 30 per cent of nickel and 15 per cent of copper, and is returned to the same furnace, which concentrates it to 60 per cent of nickel and 30 per cent of copper. The sulphur is only 10 per cent. This matte is ground and roasted completely in a small reverberatory furnace, and the oxides are reduced with charcoal powder in graphite crucibles, yielding 68 per cent of nickel and 30 per cent of copper. By the addition of copper this product is smelted into an alloy of one of copper and one of nickel, which is marketable.

The Boot and Shoe Industry.

The returns of one of the patentees who collect a royalty on every boot or shoe manufactured by machinery show that the greatest number of pairs ever turned out in one month were manufactured in September, 1878—four million one hundred and ninety-one thousand seven hundred and seventy-six pairs. For the year, however, the manufacture up to October 1 was only twenty-three million one hundred and ninety-seven thousand pairs, against twenty-five million two hundred and eighty-five thousand for the same time last year, or a reduction of about eight per cent. The total shipments from the Boston market up to date have been one million two hundred and ninety-five thousand one hundred and forty-six cases this year, against one million four thousand nine hundred and twenty-one cases for the same period last year. This falling off is due in some measure to the increased employment of shoemakers to work by hand in the old-fashioned way. There probably has never been a time when a day's work will go as far in buying boots and shoes as to-day.

Unwarranted Alarm.

A correspondent predicts volcanic disaster to follow the boring for mineral oil and the utilizing of natural gas wells, in Pennsylvania and Ohio. His opinion is that the oil and gas are the forerunners of volcanic fires, which will be brought to the surface by the "ventilation" incident to well sinking. Deep mining is another source of peril, he thinks. His anxiety arises apparently from a mistaken theory of the nature of volcanic heat and activity—namely, that it is due to combustion. Recent investigations make it altogether more probable that those phenomena are due to pressure in and the fracture of the earth's comparatively rigid exterior, in consequence of the cooling and shrinkage of its nucleus. Such being the case the predicted peril is quite imaginary.

Raft Decked River Steamers.

The Princess Alice disaster has elicited from Mr. R. F. Fairlie a suggestion that river steamers should be so built that the deck should be complete in itself, and capable of floating like a raft, even with a considerable weight of passengers, and that it should be secured to the hull by a fastening of a temporary character, which could readily be withdrawn in time of danger, leaving the hull free to sink alone, while the deck would be left upon the surface. Explaining how he would accomplish his ends, he says a simple way of fastening the deck to the hull would be by eyes descending from the under surface of the deck, and passing through slots in angle irons, which should form part of the sides and of the upper surface of the hull. Each of these eyes should receive a 1½ inch pin, and all the pins should be connected to a chain, or to levers worked by a chain, which should itself be carried to a wheel placed immediately astern of the steering wheel. It would then be easy for the steersman, on an alarm being given, to withdraw the whole of the pins by a single movement.

Spontaneous Combustion.

Dr. Hoffman has called attention to some curious cases of spontaneous ignition of hydrogen in air. The phenomenon has been noticed in factories where large quantities of zinc were being dissolved in hydrochloric acid for the preparation of zinc chloride. Violent explosions took place when no flame was near; and it was eventually ascertained that the gas took fire spontaneously. It appears to be caused by fragments of very porous zinc, which, when lifted above the surface of the liquid during the violent evolution of the gas, and so brought in contact with hydrogen and air, act just as spongy platinum would do under the circumstances. The author recommends the performance of such operations in the open air. The ignition can be shown by treating a few kilogrammes of finely divided zinc with acid. The "zinc dust" may even ignite by contact with water.

PROFESSOR S. P. LANGELY, Director of the Allegheny Observatory, in addition to the routine work connected with the institution over which he presides, has lately been busily engaged in completing a direct experimental comparison between the heat of the sun and the highest heat attainable in the arts. The result of his investigations indicate that the sun's *intrinsic* heat is almost beyond comparison greater than that of any blast furnace, and far larger than has been reckoned by the French physicists.